



**Enkase**<sup>TM</sup>

# Comparing Enkase<sup>TM</sup> with Alternatives - Barrier Additives

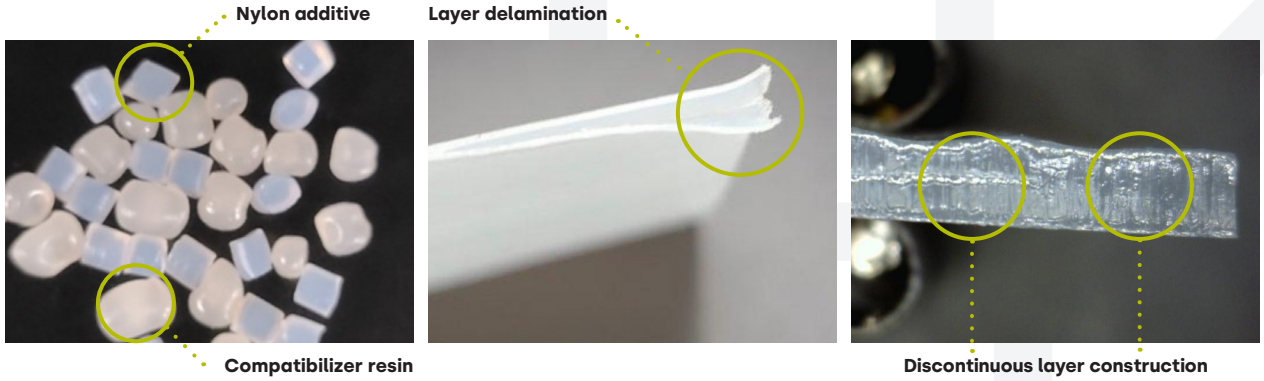
Enkase<sup>TM</sup> is a unique, permanent barrier technology that transforms conventional plastics into high performance barrier packaging. Globally recognized as recyclable, Enkase<sup>TM</sup> has one of the lowest carbon footprints of any barrier packaging, making it the most environmentally responsible and sustainable barrier technology choice.

Additives such as nylon or clays may be utilized in HDPE formulations to seek barrier properties in rigid HDPE containers. These additives are typically added as a masterbatch concentrate along with a compatibilizer into the HDPE resin, prior to the blow molding operation.

The following table lists some considerations when choosing a plastic barrier packaging technology.

	Enkase <sup>TM</sup>	Additives	Attributes of Enkase <sup>TM</sup>
<b>Quality consistency</b>	Excellent	Poor	<ul style="list-style-type: none"> <li>High consistency within each container</li> <li>Permanent barrier, does not degrade, not detachable</li> <li>Quality can be assessed without destructive testing</li> <li>Barrier imparted inside and out</li> <li>No discoloration of container</li> </ul>
<b>Barrier performance</b>	Excellent	Poor	<ul style="list-style-type: none"> <li>Up to 10x the barrier performance</li> <li>Tunable barrier performance</li> <li>Works with even the most aggressive chemistries</li> </ul>
<b>Design freedom</b>	Excellent	Poor	<ul style="list-style-type: none"> <li>Any shape or size packaging</li> <li>Any shape spouts, closures, and other components</li> <li>Thin walled containers, tubes, collapsible, standup pouches, drums, IBCs</li> <li>Enables complex container designs</li> <li>Enables light-weighting</li> </ul>
<b>Quality control</b>	Excellent	Poor	<ul style="list-style-type: none"> <li>100% quality control on every batch</li> <li>Full lot/batch traceability</li> <li>Every bottle can be field checked</li> <li>40+ years of reliable performance</li> </ul>
<b>Impact Performance</b>	Excellent	Poor	<ul style="list-style-type: none"> <li>Highest drop impact performance</li> <li>No risk of delamination of layers</li> <li>Maintains pinch-off strength as unfilled HDPE</li> </ul>
<b>Sustainability</b>	Excellent	Poor	<ul style="list-style-type: none"> <li>Certified recyclable HDPE packaging</li> <li>Plastic retains #2 HDPE designation</li> <li>Low global warming potential</li> <li>Low fossil fuel consumption</li> <li>Zero waste, zero emissions, zero water in the process</li> </ul>
<b>Processing Flexibility</b>	Excellent	Poor	<ul style="list-style-type: none"> <li>Any polyolefin container can be enhanced with Enkase<sup>TM</sup></li> <li>No special tooling, molding conditions or equipment required</li> <li>No equipment wear and tear due to abrasive additives</li> <li>Multiple production facilities available globally</li> </ul>

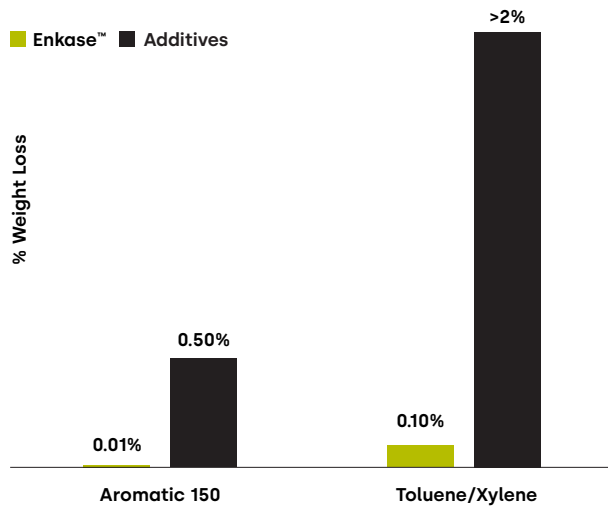
Excellent
  Good
  OK
  Poor



Additives are typically added as master batches to the HDPE resin prior to molding. Compatibilizers are often required to disperse these non-compatible additives into HDPE.

Delamination in HDPE containers made with additives.

Incomplete barrier layer in HDPE containers made with additives.



**Graph 1: Barrier performance comparison of Enkase™ and additives**

Enkase™ is pledged to the **Ellen MacArthur Foundations' New Plastics Economy Global Commitment** and is recognized by **Suez Circpack®**, the **Association of Plastics Recyclers** and **Plastic Recyclers Europe's RecyClass** as recyclable.



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